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Application Serial No.: 10/004,363
Amendment and Response to June 19, 2007 Non-Final Office Action

PENDING CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Previously presented) A method comprising:

acquiring first three-dimensional surface data representing at least a portion of a patient's body while the patient is in a first position substantially maintained during a computed tomography scan;

acquiring second data independent from the first data and representing at least one internal three-dimensional portion of the patient's body while the patient is in the first position;

determining a location of an isocenter of the patient based on the second data;

converting the first three-dimensional surface data to a coordinate frame of the patient based on the location of the isocenter;

acquiring third three-dimensional surface data representing at least the portion of the patient's body while the patient is in a second position substantially maintained in preparation for radiation treatment to be delivered by a radiation treatment station;

converting the third three-dimensional surface data to a coordinate frame of the radiation treatment station; and

determining if the first position corresponds to the second position by directly comparing the converted first three-dimensional surface data to the converted third three-dimensional surface data.

2. (Original) A method according to Claim 1, further comprising:

determining a radiation treatment plan based on the first data, the second data, and on data representing a physical layout of a radiation treatment station.

3. (Original) A method according to Claim 2, wherein the step of determining the radiation treatment plan comprises:

determining a position of a radiation treatment device that will avoid the patient's body and that will allow irradiation of a portion of the at least one internal portion.

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4. (Cancelled)

5. (Previously presented) A method according to Claim 1, further comprising:
determining, based on the first data and the third data, that the second position does not
correspond to the first position; and
instructing the patient to move so that the second position corresponds to the first
position.

6. (Cancelled)

7. (Original) A method according to Claim 5, further comprising:
changing a radiation treatment plan for the patient based on a difference between the first
position and the second position.

8. (Original) A method according to Claim 1, further comprising:
determining, based on the first data and the third data, that the patient represented by the
first data is different from the patient represented by the third data.

9. (Previously presented) A method according to Claim 1, further comprising:
determining, based on the first data and the third data, that the patient's body has changed
by greater than a threshold amount; and
in response to the determination that the patient's body has changed by greater than the
threshold amount, acquiring fourth three-dimensional surface data representing at least the
portion of the patient's body while the patient is in a third position substantially maintained
during a second computed tomography scan.

10. (Previously presented) A method according to Claim 1, further comprising:
acquiring fourth three-dimensional surface data representing at least the portion of the
patient's body while the patient is in a third position; and

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activating a radiation beam according to a radiation treatment plan if it is determined based on the fourth data that the third position corresponds to a point in a cycle of body motion specified by the treatment plan.

11. (Previously presented) A method according to Claim 10, further comprising:
acquiring fifth three-dimensional surface data representing at least the portion of the patient's body while the patient is in a fourth position; and
deactivating the radiation beam according to a radiation treatment plan if it is determined based on the fifth data that the fourth position does not correspond to the point specified by the treatment plan.

12. (Previously presented) A method comprising:
acquiring computed tomography data of a patient while the patient remains substantially in a first position;
acquiring first three-dimensional surface data of the patient independent from the computed tomography data while the patient remains substantially in the first position;
determining a radiation treatment plan based on the computed tomography data, the three-dimensional data, and data representing a physical layout of a radiation treatment station;
determining a location of an isocenter of the patient based on the computed tomography data;
converting the first three-dimensional surface data to a coordinate frame of the patient based on the location of the isocenter;
acquiring second three-dimensional surface data of the patient while the patient remains substantially in a second position at the radiation treatment station;
converting the second three-dimensional surface data to a coordinate frame of the radiation treatment station;
determining if the first position corresponds to the second position by directly comparing the converted first three-dimensional surface data to the converted second three-dimensional surface data; and
delivering radiation to the patient according to the radiation treatment plan if it is determined that the first position corresponds to the second position.

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13. (Previously presented) A system comprising:
- a computed tomography scanning device for acquiring computed tomography data of a patient while the patient is in a scanning position;
 - a first surface photogrammetry device for acquiring first three-dimensional surface data independent from the computed tomography data of at least a portion of the patient's body while the patient is in the scanning position;
 - an operator station for determining a location of an isocenter of the patient based on the computed tomography data, and for converting the first three-dimensional surface data to a coordinate frame of the patient based on the location of the isocenter;
 - a radiation treatment station for delivering radiation to the patient;
 - a second surface photogrammetry device for acquiring second three-dimensional surface data of at least the portion of the patient's body while the patient is in a treatment position on the radiation treatment station; and
 - a controller for converting the second three-dimensional surface data to a coordinate frame of the radiation treatment station, and for determining if the treatment position corresponds to the scanning position by directly comparing the converted first three-dimensional surface data to the converted second three-dimensional surface data.

14. (Previously presented) A system according to Claim 13, further comprising:
- a treatment planning device for generating a radiation treatment plan based on the computed tomography data, the first three-dimensional surface data, and data representing a physical layout of the radiation treatment station.

15. (Cancelled)

16. (Previously presented) A system according to Claim 13, wherein the first surface photogrammetry device and the second surface photogrammetry device are a same device.

17. (Previously presented) A medium storing controller-executable process steps, the process steps comprising:

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a step to acquire first three-dimensional surface representing at least a portion of a patient's body while the patient is in a first position substantially maintained during a computed tomography scan;

a step to acquire second data independent from the first data representing at least one internal three-dimensional portion of the patient's body while the patient is in the first position;

a step to determine a location of an isocenter of the patient based on the second data;

a step to convert the first three-dimensional surface data to a coordinate frame of the patient based on the location of the isocenter; a step to acquire third three-dimensional surface data representing at least the portion of the patient's body while the patient is in a second position substantially maintained in preparation for radiation treatment to be delivered by a radiation treatment station;

a step to convert the third three-dimensional surface data to a coordinate frame of the radiation treatment station; and

a step to determine if the first position corresponds to the second position by directly comparing the converted first three-dimensional surface data to the converted third three-dimensional surface data.

18. (Original) A medium according to Claim 17, the process steps further comprising:
a step to determine a radiation treatment plan based on the first data, the second data, and data representing a physical layout of a radiation treatment station.

19. (Cancelled)

20. (Previously presented) A medium according to Claim 17, the process steps further comprising:

a step to determine, based on the first data and the third data, that the patient's body has changed by greater than a threshold amount; and

a step to acquire, in response to the determination that the patient's body has changed by greater than the threshold amount, fourth three-dimensional surface data representing at least the portion of the patient's body while the patient is in a third position substantially maintained during a second computed tomography scan.

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21. (Previously presented) A medium according to Claim 17, the process steps further comprising:

a step to acquire fourth three-dimensional surface data representing at least the portion of the patient's body while the patient is in a third position; and

a step to activate a radiation beam according to a radiation treatment plan if it is determined, based on the fourth data, that the third position corresponds to a position specified by the treatment plan.

22. (Previously presented) A medium according to Claim 17, the process steps further comprising:

a step to acquire fourth three-dimensional surface data representing at least the portion of the patient's body while the patient is in a third position; and

a step to activate a radiation beam according to a radiation treatment plan if it is determined based on the fourth data that the third position corresponds to a point in a cycle of body motion specified by the treatment plan.

23. (Previously presented) A medium according to Claim 22, the process steps further comprising:

a step to acquire fifth three-dimensional surface data representing at least the portion of the patient's body while the patient is in a fourth position; and

a step to deactivate the radiation beam according to a radiation treatment plan if it is determined based on the fifth data that the fourth position does not correspond to the point specified by the treatment plan.

24. (Cancelled)

25. (Cancelled)

26. (Cancelled)

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27. (Cancelled)

28. (Cancelled)

29. (Cancelled)